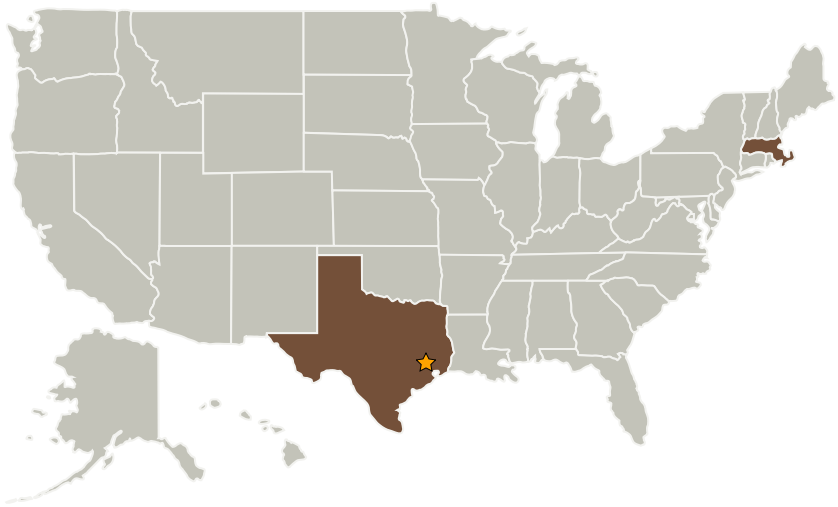
Multi-Use Solar Thermal System for Oxygen Production from Lunar Regolith [7227-570], Phase II

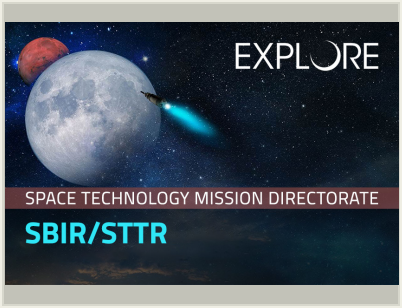
Completed Technology Project (2008 - 2010)

Project Introduction

We propose to develop an innovative solar thermal system for oxygen production from lunar regolith. In this system solar radiation is collected by the concentrator array which transfers the concentrated solar radiation to the optical waveguide (OW) transmission line made of low loss optical fibers. The OW transmission line directs the solar radiation to the thermal receiver for processing of lunar regolith for oxygen production. Key features of the proposed system are: 1. Highly concentrated solar radiation (~ 4×103suns) can be transmitted via the flexible OW transmission line directly to the thermal receiver for oxygen production from lunar regolith; 2. Power scale-up of the system can be achieved by incremental increase of the number of concentrator units; 3. The system can be autonomous, stationary or mobile, and easily transported and deployed on the lunar surface; and 4. The system can be applied to a variety of oxygen production processes. The proposed Phase II program consists of the following tasks: Task-1: Develop an engineering prototype of the solar thermal system. Task-2: Integrate the solar thermal system with the carbothermal process reactor for utility demonstration and performance evaluation. Task-3: Improve the key components to the level acceptable for a space-based operational system.

Primary U.S. Work Locations and Key Partners





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Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Center / Facility:

Johnson Space Center (JSC)

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Small Business Innovation Research/Small Business Tech Transfer

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Organizations Performing Work	Role	Type	Location
★Johnson Space Center(JSC)	Lead Organization	NASA Center	Houston, Texas
Physical Sciences, Inc.	Supporting Organization	Industry	Andover, Massachusetts

Primary U.S. Work Locations	
Massachusetts	Texas

Project Transitions

March 2008: Project Start

March 2010: Closed out

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Technology Areas

Primary:

- TX07 Exploration Destination Systems
  - TX07.1 In-Situ Resource Utilization
    - TX07.1.3 Resource Processing for Production of Mission Consumables